

REMARKS

Claims 1-15 have been rejected under 35 U.S.C. §112, second paragraph for failing to particularly point out and distinctly claim the invention, based on a formal issue cited in paragraph 2 of the Office Action. In particular, the phrase "at least first and second...direction forward of the antenna" is said to make it unclear whether the limitations which follow that phrase are part of the claimed invention. This ground of rejection is not understood, and is believed to be unwarranted.

Claim 1 clearly recites a dual polarized antenna that includes 1) at least first and second substantially planar Vivaldi antenna elements; and 2) antenna element feeds. The language which follows each of the above items in the first and second paragraphs of the body of Claim 1, as it existed prior to the present amendment, clearly characterizes and further limits each of the two recited components of the antenna (that is, the antenna elements and the antenna element feeds). Thus, for example, the first paragraph specifies that the antenna elements have active portions for receiving or radiating signals from a direction forward of the antenna. In addition, the first paragraph also specifies that the antenna elements have mutually intersecting planes and that phase centers of the antenna elements are substantially collocated. Similar comments can be

made regarding the antenna element feeds, and the language which follows that recitation in the second paragraph of the body of Claim 1.

While Claim 1 is therefore believed to be clear and definite, and to recite specific limitations in its previous format, by the foregoing amendment it has been reformatted in order to further clarify that the language referred to previously does set forth limitations which further qualify and define the antenna elements and the antenna element feeds. Claims 14 and 15 have been amended in the same manner. Accordingly, Applicants respectfully submit that all claims of record in this application are clear and definite.

Claims 1-15 have been rejected under 35 U.S.C. §102(b) as anticipated by Gibson et al (EP 0 349 069 A1). In addition, Claim 4 has been rejected under 35 U.S.C. §103(a) as unpatentable over Gibson et al. However, for the reasons set forth hereinafter, Applicants respectfully submit that all claims of record in this application distinguish over Gibson et al, whether considered separately or in combination with other references.

The present invention is directed to an antenna arrangement which includes at least first and second substantially planar Vivaldi antenna elements which have active portions for receiving or radiating signals from a direction forward of the antenna. As specified in each of Claims 1, 14 and 15, the antenna elements have mutually intersecting planes. In addition, Claims 1, 14 and 15 further specify that the phase centers of the active portions of the antenna

elements are substantially collocated. Such collocation is achieved by positioning the antenna feed elements at a location which is displaced from an axis that extends through the phase centers and the intersection of the planes of the antenna rearward of the active portions.

As noted in the specification of the application, if the phase centers of the active portions of the antenna elements are not collocated, it is necessary to utilize signal processing equipment that compensates for the arrival of an incoming signal at the respective phase centers at different times. The need for such additional equipment is of course undesirable. However, such collocation of the phase centers of the active portions has heretofore been problematic, due to difficulty in coupling signals into and out of the Vivaldi notch. This problem is discussed in the Gibson et al reference (EP 0 349 069) cited in the Office Action. (See Column 2, lines 37 to 44, which states, among other things, that, "[T]he coincidence of the antenna elements 2 with the corresponding slot 6 will make it impossible to use the conductive cladding to carry interconnections along the boards from one antenna element to another and such interconnections would therefore have to be made external to the board adding to the expense of manufacture.")

In contrast to the present invention, however, the solution adopted by Gibson et al is to offset the phase centers. Thus, for example, in the abstract, it is stated that "the phase center (16) of those antenna elements (17) relating to

one polarization direction are offset from the phase centers corresponding antenna elements relating to the other polarization direction". This feature of the Gibson et al apparatus is illustrated in Figure 2, and discussed in the specification at Column 5, lines 42 *et seq.* which reiterates the proposition that "the phase centres 16 of those antenna elements 17 on the planar supports 11 forming the matrix array relating to one polarization direction (horizontal), are offset from the phase centres 16 of corresponding antenna elements on the planar supports 12 forming the matrix array relating to the other polarization direction". Accordingly, Gibson et al teaches that in order to provide an antenna feed, it is necessary to configure the respective antenna elements such that their phase centers are offset, and expensive signal processing is then required in order to compensate for the time difference of arrival of signals at the respective antenna elements.

Thus, Gibson et al does not disclose an antenna arrangement in which the antenna elements are arranged to have substantially collocated phase centers, with the antenna feeds coupled to the elements at a position displaced from an axis extending through the phase centers and the intersection of the planes of the antennas. This can be seen by referring to Figure 2, in particular, in which the planes intersect to form the corners of a box. The phase centers of the elements are not located at the corners, but toward the center of the box.

In addition, each of Claims 1, 14 and 15 has been amended to recite further that "each antenna element comprises a feed flare and an end flare, with a substantially constant slot section disposed therebetween". Gibson et al also fails to teach or suggest the latter limitation, and accordingly, Claims 1, 14 and 15 further distinguish over that reference for this additional reason as well.

Applicants note that the antenna according to the present invention is a broadband antenna. The feed to each of the antenna elements is very wide band, as is the Vivaldi radiating section also. This arrangement has been achieved by splitting a fractalled Vivaldi curve into two sections, the feed flare and the end flare, with a constant section between the former two sections. As noted previously, the latter feature of the invention is neither taught nor suggested by Gibson et al. Nor is it taught or suggested by U.S. Patent No. 5,268,701 (Smith) which has been submitted concurrently herewith, in an Information Disclosure Statement.

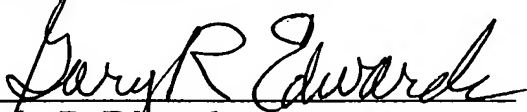
In light of the foregoing remarks, this application should be in condition for allowance, and early passage of this case to issue is respectfully requested. If there are any questions regarding this amendment or the application in general, a telephone call to the undersigned would be appreciated since this should expedite the prosecution of the application for all concerned.

If necessary to effect a timely response, this paper should be considered as a petition for an Extension of Time sufficient to effect a timely response, and

Serial No. 10/606,113
Reply Dated: July 11, 2005
Reply to Office Action Mailed March 9, 2005
Attorney Docket No. 038819.52556US

please charge any deficiency in fees or credit any overpayments to Deposit
Account No. 05-1323 (Docket #038819.52556US).

Respectfully submitted,



Gary R. Edwards
Registration No. 31,824

CROWELL & MORING LLP
Intellectual Property Group
P.O. Box 14300
Washington, DC 20044-4300
Telephone No.: (202) 624-2500
Facsimile No.: (202) 628-8844
GRE:kms

385143v1